CLAIMS

1. A multi-stage solar concentrator in combination with a solar oven for a magnetohydrodynamic (MHD) electrical power generation system, said combination including:

a planar solar collector for collecting ambient solar radiation, said collector associated with a compound parabolic solar concentrator that together form the multi-stage solar concentrator;

a solar oven adapted for use in a fluid circuit of the MHD system and for receiving concentrated solar energy from the solar concentrator; and

whereby, in use, the solar concentrator provides sufficient radiative energy to at least partially ionise the working fluid contained in the solar oven.

2. The solar concentrator and oven combination of claim 1 wherein the planar solar collector is static relative to the compound parabolic solar concentrator.

3. The solar concentrator and oven combination of either claim 1 or claim 2 wherein the planar solar collector incorporates a Fresnel lens or a luminescent dopant for shifting the wavelength of incident solar radiation.

4. The solar concentrator and oven combination of either claim 1 or claim 2 wherein the planar solar collector includes a plate having reflective side walls.

5. The solar concentrator and oven combination of claim 3 wherein the wavelength of the incident solar radiation is shifted predominantly into the wavelengths suited to ionising said working fluid.

6. The solar concentrator and oven combination of claim 3 wherein the luminescent dopant suitably comprises a dye.

7. The solar concentrator and oven combination of any one of claims 1 to 5 wherein the planar solar collector further includes a base having a reflective

geometrical scheme, suitably comprising an array of tilted pyramidal reflectors, for redirecting radiation into the throat of the compound parabolic solar concentrator.

8. The solar concentrator and oven combination of claims 1 to 6 wherein the solar concentrator further includes a paraboloidal mirror disposed between the planar collector and the compound parabolic stages of the solar collector.

9. The solar concentrator and oven combination of either claim 6 or claim 7 wherein the paraboloidal mirror reflects radiation redirected by the pyramidal array.

10. The solar concentrator and oven combination of claim 1 wherein interior surfaces of the solar concentrator are coated with a heat resistant gel, suitably comprised of an anionic water absorbent polymer.

11. The solar concentrator and oven combination of claim 1 wherein the solar concentrator is a hermetically sealed module constructed from a dielectric material.

12. A magnetohydrodynamic (MHD) electrical power generation system supplied by solar energy, said MHD system including:

a multi-stage solar concentrator for collecting and concentrating ambient solar radiation, including -

a planar solar collector, and

a compound parabolic solar concentrator receiving photons from said planar solar collector;

a solar oven arranged in a fluid circuit of the MHD system and coupled to the solar concentrator whereby, in use, sufficient radiative energy is provided by the solar concentrator to at least partially ionise the working fluid contained in the solar oven;

said fluid circuit further including -

an electrode chamber for accelerating the ionised working fluid in order to generate electrical current,

a seeding device for injecting a seed material into said working fluid,

a separator coupled to the electrode chamber for separating the seed material from the working fluid for return to the seeding device,

a regenerative heat exchanger coupled to the separator for recovering heat from the working fluid, and

a compressor supplied by the heat exchanger and a gas source for returning the working fluid to the solar oven.

13. The MHD system of claim 11 wherein the multi-stage solar concentrator further includes a paraboloidal mirror receiving photons from the planar solar collector, whereby the compound parabolic solar concentrator receives photons from both said planar solar collector and said paraboloidal mirror.

14. The MHD system of claim 11 wherein the seed material comprises statically charged particles, such as carbon particles.

15. The MHD system of claim 13 wherein a subsidiary photovoltaic array may be provided for supplying voltage for charging said particles.

16. The MHD system of claim 11 wherein the fluid circuit further includes a storage chamber for storing excess heated working fluid.

17. The MHD system of claim 15 wherein excess heated working fluid is supplied to the storage chamber either directly from the solar oven or indirectly from the heat exchanger in the fluid circuit.

18. The MHD system of claim 11 wherein working fluid from the storage chamber may be re-introduced into the fluid circuit via the compressor.

19. The MHD system of claim 11 wherein a second solar concentrator is coupled to a radiator associated with the storage chamber for providing further thermal energy to said chamber.

20. The MHD system of claim 11 wherein a plurality of solar concentrators are arranged to direct radiative energy through one or more foci a plural number of times to ionize said working fluid in order to provide moving charged particles, which particles are compressed by a magnetic field and directed through the MHD electrode chamber for the generation of electricity.

21. A multi-stage solar concentrator for use in process heating applications, said concentrator including:

a planar solar collector;

and

a compound parabolic solar concentrator receiving photons from both said planar solar collector and said paraboloidal mirror.

22 The multi-stage solar concentrator of claim 20 wherein the planar solar collector is static relative to the compound parabolic solar concentrator.

23. The multi-stage solar concentrator of claim 20 further including a paraboloidal mirror receiving photons from the planar solar collector, whereby the compound parabolic solar concentrator receives photons from both said planar solar collector and said paraboloidal mirror.

24. A multi-stage solar concentrator substantially as hereinbefore described and/or illustrated in any one or more of the accompanying drawings.

25. A magnetohydrodynamic (MHD) electrical power generation system substantially as hereinbefore described and/or illustrated in any one or more of the accompanying drawings.